

§ 7.48

force exerted by the deflection measurement device.

(5) Use a deflection measuring device with an accuracy of ± 0.001 inches to measure the deflection of the sample at the point of loading as the temperature of the medium is increased at a uniform rate of $3.6 \pm .36$ °F/min. (2 ± 0.2 °C/min.). Apply the load to the sample for 5 minutes prior to heating, to allow compensation for creep in the sample due to the loading.

(6) Record the deflection of the sample due to heating at 180 °F (82 °C).

(7) Repeat steps 2 through 6 for the other sample.

(b) *Acceptable performance.* Neither sample shall have a deflection greater than .010 inch at 180 °F (82 °C).

[53 FR 23500, June 22, 1988; 53 FR 25569, July 7, 1988; 60 FR 33723, June 29, 1995]

§ 7.48 Acid resistance test.

(a) *Test procedures.* (1) Prepare one sample each of the insulated surfaces of the battery box and of the cover that measure at least 4 inches by 8 inches, by the thickness of the sample which includes the insulation plus the battery cover or box material. The insulation thickness shall be representative of that used on the battery box and cover. If the insulation material and thickness of material are identical for the battery box and cover, only one sample need be prepared and tested.

(2) Prepare a 30 percent solution of sulfuric acid (H_2SO_4) by mixing 853 ml of water with 199 ml of sulfuric acid (H_2SO_4) with a specific gravity of 1.84. Completely cover the samples with the acid solution at the test temperature range of 65 °F–80 °F (18.3 °C–26.7 °C) and maintain these conditions for 7 days.

(3) After 7 days, record the condition of the samples.

(b) *Acceptable performance.* At the end of the test, the insulation shall not exhibit any blistering, discoloration, cracking, swelling, tackiness, rubberiness, or loss of bond.

[53 FR 23500, June 22, 1988, as amended at 60 FR 33723, June 29, 1995]

§ 7.49 Approval marking.

Each approved battery assembly shall be identified by a legible and per-

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manent approval plate inscribed with the assigned MSHA approval number and securely attached to the battery box.

§ 7.50 Post-approval product audit.

Upon request by MSHA, but no more than once a year except for cause, the approval-holder shall make an approved battery assembly available for audit at no cost to MSHA.

§ 7.51 Approval checklist.

Each battery assembly bearing an MSHA approval plate shall be accompanied by a description of what is necessary to maintain the battery assembly as approved.

[53 FR 23500, June 22, 1988, as amended at 60 FR 33723, June 29, 1995]

§ 7.52 New technology.

MSHA may approve a battery assembly that incorporates technology for which the requirements of this subpart are not applicable, if the Agency determines that the battery assembly is as safe as those which meet the requirements of this subpart.

Subpart D—Multiple-Shot Blasting Units

SOURCE: 54 FR 48210, Nov. 21, 1989, unless otherwise noted.

§ 7.61 Purpose and effective date.

This subpart establishes the specific requirements for MSHA approval of multiple-shot blasting units. It is effective January 22, 1990. Applications for approval or extensions of approval submitted after January 22, 1991 shall meet the requirements of this subpart.

§ 7.62 Definitions.

The following definitions apply in this subpart:

Blasting circuit. A circuit that includes one or more electric detonators connected in a single series and the firing cable used to connect the detonators to the blasting unit.

Blasting unit. An electric device used to initiate electric detonators.

Normal operation. Operation of the unit according to the manufacturer's

instructions with fully-charged batteries, with electric components at any value within their specified tolerances, and with adjustable electric components set to any value within their range.

§ 7.63 Application requirements.

(a) Each application for approval of a blasting unit shall include the following:

(1) An overall assembly drawing showing the physical construction of the blasting unit.

(2) A schematic diagram of the electric circuit.

(3) A parts list specifying each electric component and its electrical ratings, including tolerances.

(4) A layout drawing showing the location of each component and wiring.

(5) The model number or other manufacturer's designation of the blasting unit.

(b) All drawings shall be titled, numbered, dated, and include the latest revision number. The drawings may be combined into one or more composite drawings.

(c) The application shall contain a list of all the drawings submitted, including drawing titles, numbers, and revisions.

(d) A detailed technical description of the operation and use of the blasting unit shall be submitted with the application.

[54 FR 48210, Nov. 21, 1989, as amended at 60 FR 33723, June 29, 1995]

§ 7.64 Technical requirements.

(a) *Energy output.* Blasting units shall meet the acceptable performance criteria of the output energy test in § 7.66.

(b) *Maximum blasting circuit resistance.* The maximum value of the resistance of the blasting circuit that can be connected to the firing line terminals of the blasting unit, without exceeding its capacity, shall be specified by the applicant. The specified maximum blasting circuit resistance shall be at least 150 ohms.

(c) *Visual indicator.* The blasting unit shall provide a visual indication to the user prior to the operation of the firing switch when the voltage necessary to

produce the required firing current is attained.

(d) *Firing switch.* The switch used to initiate the application of energy to the blasting circuit shall—

(1) Require deliberate action for its operation to prevent accidental firing; and

(2) Operate only when the voltage necessary to produce the required firing current is available to the blasting circuit.

(e) *Firing line terminals.* The terminals used to connect the blasting circuit to the blasting unit shall—

(1) Provide a secure, low-resistance connection to the blasting circuit as demonstrated by the firing line terminals test in § 7.68;

(2) Be corrosion-resistant;

(3) Be insulated to protect the user from electrical shock; and

(4) Be separated from each other by an insulated barrier.

(f) *Ratings of electric components.* No electric component of the blasting unit, other than batteries, shall be operated at more than 90 percent of any of its electrical ratings in the normal operation of the blasting unit.

(g) *Non-incendive electric contacts.* In the normal operation of a blasting unit, the electric energy discharged by making and breaking electric contacts shall not be capable of igniting a methane-air atmosphere, as determined by the following:

(1) The electric current through an electric contact shall not be greater than that determined from Figure D-1.

(2) The maximum voltage that can be applied across an electric contact that discharges a capacitor shall not be greater than that determined from Figure D-2.

(3) The electric current through an electric contact that interrupts a circuit containing inductive components shall not be greater than that determined from Figure D-3. Inductive components include inductors, chokes, relay coils, motors, transformers, and similar electric components that have an inductance greater than 100 microhenries. No inductive component in a circuit with making and breaking electric contacts shall have an inductance value greater than 100 millihenries.